Table 9. Correlation between cover type and biomass, by biomass compartments. Critical values are 0.361 (P = 0.05), 0.463 (P = 0.01), and 0.570 (P = 0.001), df = 28. NS = not significant (P > 0.05).

	Correlation coefficient	Probability
Tree	0.711	P < 0.001
Shrub	0.387	P < 0.05
Sapling & Subcanopy	0.188	NS
Herb (incl. crops)	(0.449)	P < 0.05
Woody seedlings	(0.157)	NS
Vine	(0.055)	NS
Total live biomass	0.626	P < 0.001
Litter	0.392	P < 0.05
Snag	0.042	NS
Large down wood	0.572	P < 0.01
Soil organic matter	0.706	P < 0.001
Total detrital biomass	0.644	P < 0.001
Total biomass	0.827	P < 0.001

Relation of biomass to surface water nutrients

Total biomass for each cover type was used to derive a Riparian Zone Cover (RZC) index for biomass that took into account relative biomass and distance from stream. This was used in Rheinhardt et al. (2005) to scale riparian zone condition and near stream condition. Biomass values were indexed on Old Forest biomass (Table 10). A comparison of biomass of the instrumented reaches (A-F) with concentration of nutrients in storm events shows the relationship between riparian condition and concentrations of nitrate in stream and in groundwater (Figure 20). The two channelized and un-buffered reaches (E, F) had the highest nutrient concentrations, the natural channel reaches with forested riparian zone (A-C) had the lowest, and the minimally vegetated but channelized reach (D) had intermediate nitrate concentrations. These data provide strong evidence that vegetation cover condition of the riparian zone (0-15 m zone) is a predictive indicator of the nutrient condition of headwater streams, i.e., unchannelized streams buffered by forest are more effective in sequestering nutrients entering riparian areas from adjacent uplands than are channelized streams with partially forested or herbaceous riparian zones.

To test whether this relationship between riparian condition and nutrient concentration also exists in higher order streams, we compared water-chemistry sampling in a network of streams in the drainage basin, ranging from headwater (1st and 2nd order) streams to 3rd and 4th order streams (Figure 21). The headwater streams (Figure 21a) represented a range of land-use and riparian condition similar to Reaches A-F (Figure 20). Figure 21a shows a pattern similar to Figure 20, with low nitrate in stream reaches buffered by forest (site 1(a)), intermediate levels in reaches with mixed riparian condition (sites 1(b), 2(a), and 2(b)), and higher nitrate in stream reaches that lack a forested riparian zone (sites 1(c) and 1(d)). In contrast, nitrate concentrations in higher-order reaches show lower variation (Figure 21b), reflecting the flow-weighted aggregation of all streams in the drainage basin rather than local riparian condition.